

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Learner Registration Number

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Pearson BTEC Level 3 Nationals Certificate, Extended Certificate

Time 1 hour 30 minutes

**Paper
reference**

21325L

Applied Human Biology

UNIT 1: Principles of Applied Human Biology

You must have:

A calculator and a ruler.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and learner registration number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

- 1 (a) Protein is needed in a balanced diet.

Figure 1 shows a section of a protein molecule.

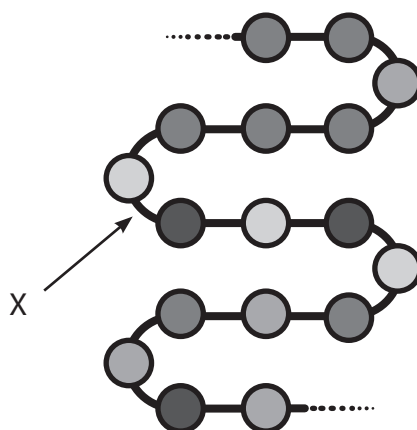


Figure 1

- (i) Identify the type of chemical bond labelled X in Figure 1.

(1)

☐	A glycosidic
☐	B hydrogen
☐	C ionic
☐	D peptide

- (ii) Which enzyme breaks down protein molecules in the small intestine?

(1)

☐	A amylase
☐	B catalase
☐	C myosin
☐	D trypsin



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(2)

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2

(Total for Question 1 = 7 marks)



Turn over ►

2 Human cells have many organelles.

- (a) (i) Complete Table 1 to show the name and function of some organelles found inside human cells.

(3)

name of organelle	function of organelle
80s ribosome	
.....	contains the chromosomes
Golgi apparatus	

Table 1

- (ii) The endoplasmic reticulum is a network of tubes found in the cytoplasm of most human cells.

Give **one** structural difference between the rough endoplasmic reticulum and the smooth endoplasmic reticulum.

(1)

.....

.....

- (b) Substances are transported across the plasma cell membrane in different ways.

Select **two** transport mechanisms which use ATP.

(2)

☐	A active transport
☐	B diffusion
☐	C exocytosis
☐	D facilitated diffusion
☐	E osmosis

(Total for Question 2 = 6 marks)



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3 The body's immune system has specific and non-specific defences.

(a) Active and passive immunity are specific defences.

Explain **two** differences between active immunity and passive immunity.

(4)

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(b) Explain how non-specific defences prevent infection.

Your answer should include reference to:

- chemical defences
- physical barriers.

(6)

(Total for Question 3 = 10 marks)



P 6 7 6 3 4 A 0 7 2 0

4 Blood tests can give doctors information about a patient's health.

A full blood count showed that a patient had an increased number of white blood cells and a decreased number of red blood cells.

(a) Explain what these results may indicate about the patient's health.

(4)

Increased number of white blood cells

.....

.....

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.....

Decreased number of red blood cells

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(b) A patient with AIDS is given a full blood count.

The result of the blood test showed that the patient has a decreased T helper cell count.

Explain why.

(2)

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- (c) The level of C-Reactive protein (CRP) in the blood can be measured with a blood test.

State the cause of increased levels of CRP in the blood.

(1)

- (d) Nurses wear gloves when taking a blood sample from a patient.

Give **one other** safety precaution that should be used.

(1)

(Total for Question 4 = 8 marks)



5 The cell cycle has different stages.

(a) Figure 2 shows the stages of the cell cycle.

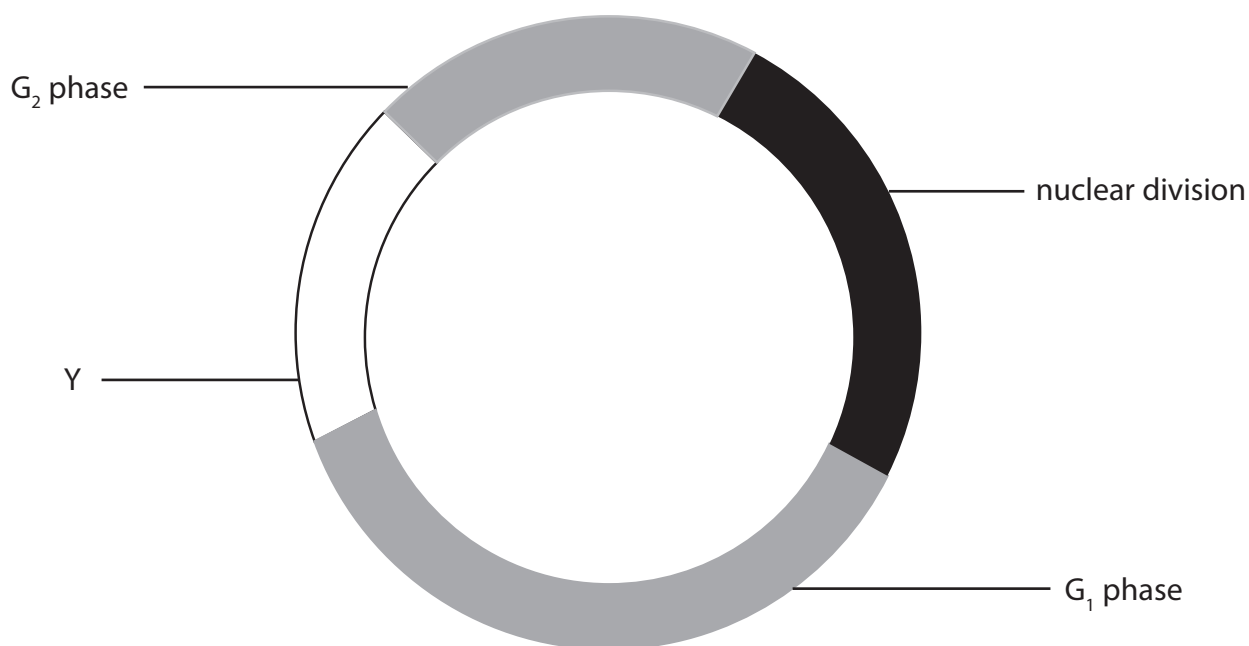


Figure 2

(i) Name the stage of the cell cycle labelled **Y** in Figure 2.

(1)

(ii) Describe the changes that happen inside the cell during the G₁ and G₂ phases of the cell cycle.

(3)



(b) Spindle fibres have an important function in nuclear division.

(i) Name the organelle that produces spindle fibres.

(1)

(ii) Which stage of nuclear division involves the two sister chromatids being pulled apart by the spindle fibres?

(1)

☐	A anaphase
☐	B metaphase
☐	C prophase
☐	D telophase

(c) Meiosis and mitosis are both types of nuclear division.

Explain **two** differences between mitosis and meiosis.

(4)

1

2

(Total for Question 5 = 10 marks)



P 6 7 6 3 4 A 0 1 1 2 0

6 The body needs a good supply of glucose to use in respiration.

(a) (i) Name the organ where excess glucose is stored as glycogen.

(1)

.....

(ii) Name the hormone that stimulates the conversion of glycogen to glucose.

(1)

.....

(b) A person with diabetes cannot regulate their blood glucose levels.

Diabetes can be classified as Type 1 or Type 2.

Discuss the causes of Type 1 diabetes and Type 2 diabetes.

(9)

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(Total for Question 6 = 11 marks)



7 Nerves transmit impulses around the body.

Nerve conduction velocity (NCV) is the speed at which impulses travel.

- (a) A change in a person's NCV may indicate a problem in the nervous system.

Table 2 shows the results from **two** NCV tests from the same person, taken one year apart.

year	NCV (m/s)
2019	57
2020	42

Table 2

Calculate the percentage decrease in the person's NCV.

(3)

percentage decrease = ... %

- (b) The NCV is different in myelinated neurones and unmyelinated neurones.

- (i) Explain how myelination affects the NCV.

(3)

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(ii) Multiple sclerosis (MS) is a condition that affects the nervous system.

MS causes demyelination of the nerves.

Explain how MS leads to demyelination.

(3)

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P 6 7 6 3 4 A 0 1 5 2 0

(c) (i) Another way of assessing nerve function is to use a reflex test.

One reflex test involves tapping a tendon in a patient's knee.

Describe the pathway taken by the impulse during the reflex test.

(4)

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(ii) Which of the following is an example of a reflex action?

(1)

☐	A driving a car
☐	B eating when hungry
☐	C pupils dilating in low light
☐	D tapping feet to music

(Total for Question 7 = 14 marks)



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8 Diagnostic tests during pregnancy can give information about the health of the mother and the health of the foetus.

(a) A blood typing test is an example of a diagnostic test.

Describe how blood type is determined.

(2)

.....

.....

.....

.....

(b) Table 3 shows the blood types of two parents and their child.

	blood type
mother	O
father	A
child	O

Table 3

The allele for blood type O is recessive to the allele for blood type A.

Explain how their child inherited the O blood type.

You may include a diagram in your answer.

(3)

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(c) Prenatal tests give doctors information about the health of a fetus.

Two examples of prenatal tests are chorionic villus sampling and amniocentesis.

Figure 3 shows how samples are taken for each type of test.

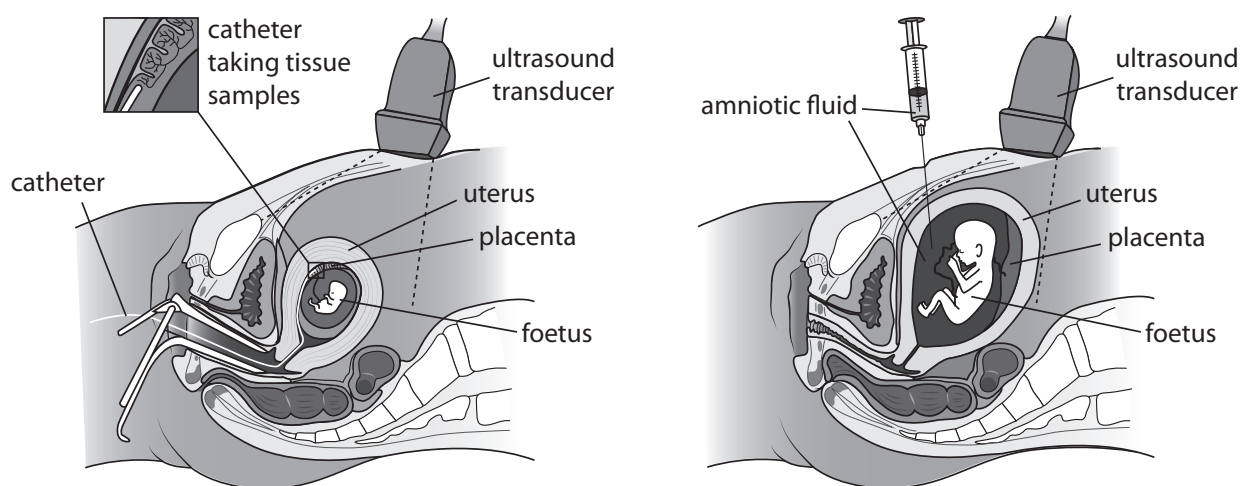


Figure 3

Evaluate the use of amniocentesis and chorionic villus sampling tests during pregnancy.

Your answer should consider:

- the reasons for each test
- the processes
- the risks for each test.

(9)



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(Total for Question 8 = 14 marks)

TOTAL FOR PAPER = 80 MARKS

